The second part of the temporal muscle has the usual origin and insertion.

The superficial temporal weighs . . . . . 6 oz.

The true temporal, ... $16\frac{1}{2}$ oz.

The vertical fibres of the *masseter* close the jaw directly without producing any pressure on the joint; but the fan-shaped fibres of this muscle cause a powerful pressure on the condyle of the lower jaw, forcing it backwards into its socket. Such seems to be also the function of the superficial fibres of the temporal muscle, which press the condyle into its socket, as well as close the mouth. This pressure seems to be necessary, in consequence of the habit the Lion has of carrying his prey in his mouth for a long time before he devours it; for the weight so carried would inevitably dislocate the jaw, if there were not a special provision made in the action of the masticating muscles to guard against it.

3. *MM. pterygoidei.*

The first part of these (*externus*) weighs . . . . . $\frac{3}{4}$ oz.

Its origin is the posterior portion of the pterygoid plate, and it is inserted into the *masseter* muscle at the angle of the jaw. Its action is to draw the fibres of the masseter forward, and give them a longer leverage.

The second portion of the pterygoid muscle (internus) weighs 2 oz.

It arises from the anterior portion of the pterygoid plate, with an extensive origin also from the floor of the orbit, and is inserted two inches from the angle of the jaw.

Its action is to close the jaw, and draw it forward.

4. *M. digastricus,* . . . . . $2\frac{1}{2}$ oz.

This is the proper muscle for opening the mouth in all the carnivora.

Its origin is the mastoid process.

Its insertion is into a line $3\frac{1}{2}$ inches in length backwards from the symphysis of the jaw, along the mylo-hyoid ridge.

The Rev. Samuel Haughton, M. D., Fellow of Trinity College, Dublin, read the following Paper:—

Notes on Animal Mechanics.

No. V.—The Muscular Anatomy of the Seal.*

The muscular anatomy of the Seal differs in many important particulars from that of the other Carnivores; and this difference seems to be occasioned principally by its aquatic habits, which render it better adapted for locomotion in the water than on dry land. In the anterior

* The drawings from which the woodcuts were made were taken from nature by my son.

limbs, everything is sacrificed to the swimming action of the arms, which seem to be placed in the centre of elliptical masses of muscles converging to a common centre, the fibres of which, by their successive contraction, produce the monotonous circular motion requisite for swimming; while the feathering action of the hand is provided for by powerful supinators. In the posterior extremity the swimming action is more like that of the tail of the fish, and consequently the feet are blended with the tail, and their swimming action is effected chiefly by lowering the insertions of all the muscles, thus sacrificing the delicate motions of the thigh to the coarser action of the whole leg, considered rather as a portion of the tail than as a distinct member of the body.

Notwithstanding this subordination of the function of the muscles in both extremities to the purposes of a single and simple action, it is wonderful to observe how perfectly each muscle retains its individuality; so much so, indeed, that there are few animals whose muscles in both limbs are more perfectly developed than are those of the Seal.

Part I.—Muscles of the Anterior Limbs.

1. *M. pectoralis major*, ... 10 oz.
   This muscle arises from the whole length of the sternum (14 inches), and is inserted into the well-marked pectoral ridge of the humerus; its fibres are succeeded at the xiphoid cartilage by the converging fibres of the next muscle, which forms the lower half of the superficial muscular ellipse, having its centre at the head of the humerus.
2. *M. latissimus dorsi superficialis*, ... 18 oz.
   Origin; usual origin from posterior aspects of posterior ribs and back, in front blending with the *panniculus carnosus*, it takes an origin from the anterior line of the pelvis and mesian line of the abdomen, completing its semielliptical origin at the xiphoid cartilage, where it is succeeded by the great pectoral.
   Insertion; by means of a tendon common to it and *great pectoral* into pectoral ridge.
3. *M. Trapezius*, ... 4½ oz.
   Origin; from all the cervical and dorsal vertebræ.
   Insertion; into the outer side of head of humerus, and into the spine of the scapula.
   This muscle continues through another quadrant the elliptical circuit of muscles commenced by Nos. 1 and 2.
4. *M. humero-occipitalis*, ... 4 oz.
   Origin; from posterior line of the aponeurotic origin of the temporal muscle.
   Insertion; pectoral ridge of humerus, inner side.
   This muscle is continuous with the *trapezius* behind, and with the *pectoralis major* in front, and completes the elliptical circuit of superficial muscles, which may be regarded as an essential characteristic of aquatic quadrupeds. It corresponds to the su-

perior part of the human trapezius, which is inserted in the clavicle.

5. *M. Sternomastoideus.*

The sternal portion of the mastoid muscle is represented in the Seal by two distinct muscles—

(*a*)—The first having its origin inside the top of the sternum, and its insertion, by a fine tendon, into the mastoid portion of the temporal bone, ... 1 oz.

(*b*)—The second having its origin from the whole length of the first rib; and its insertion into the under part of the lower jaw, near the symphysis.

6. *M. Omo-atlanticus*, ... $1\frac{1}{4}$ oz.

Origin; from transverse process of the atlas.

Insertion; into the top of the pectoral ridge of the humerus, on the outer side.

This is the muscle which I have described in Note 2, as occurring in *Cercopithecus* and *Macacus*, under the name of *trachelo-acromius*, of Cuvier. In the Seal, its insertion is shifted from the spine of the scapula to the humerus, where it assists the general swimming or rotatory action of the limb.

7. *M. levator anguli anterioris scapulæ*, ... $\frac{3}{4}$ oz.

Origin; from the transverse process of the atlas.

Insertion; into the vertebral edge of the scapula, at the end of the scapular ridge.

This is the *levator anguli scapulæ* of anthropotomists, with origin and insertion somewhat shifted; it is really a portion of the *M. serratus magnus.*

8. *M. serratus magnus*, ... *not recorded.*

Origin; from the transverse processes of the cervical vertebræ from the 2nd to the 7th.

Insertion; into the vertebral edge of the scapula, behind its spine.

9. *M. levator anguli posterioris scapulæ*, ... $1\frac{1}{2}$ oz.

Origin; central portion of occipital ridge.

Insertion; posterior exterior angle of vertebral edge of scapula; marked *d*, Fig. 17.

The mechanical action of both levators is similar.

10. *M. latissimus dorsi proprius*, ... $3\frac{3}{4}$ oz.

The true *latissimus dorsi* underlies the superficial, already noticed, and consists of two parts, quite distinct, viz.—

(1) Humero-dorsalis, ... $\frac{3}{4}$ oz.

(2) Scapulo-costalis, ... 3 oz.

The first of these muscles (1), or *humero-dorsalis*, represents the *latissimus dorsi* of anthropotomists; its origin is from the spinous processes of the posterior dorsal vertebræ and from their ribs; and its insertion is by means of a tendon common to it and the *M. teres inferior* into the inner side of the upper part of the humerus, at the line marked (*b*) in Fig. 16.

Its action is to rotate the arm inwards, and extend it upon the body; and it also serves mechanically, to keep the posterior angle of the scapula close to the ribs, for in passing to its insertion in the humerus, it overlaps the scapula over the space marked (*a*) in Fig. 17, which also represents the origin of the *teres inferior* muscle.

Fig. 16.

The second part of the true *latissimus dorsi* muscle, (2) called *scapulo-costalis*, has an abdominal origin (with indigitations), corresponding to the dorsal origin of the *humero-dorsalis*, beneath which it passes to be inserted on the inner face of the cartilaginous prolongation of the vertebral edge of the scapula marked *a* in Fig. 16. These two muscles form a portion of an inner elliptical plane of converging fibres, corresponding to the outer plane of the superficial *latissimus dorsi*, whose function as a swimming muscle has been already noticed.

11. *M. teres inferior*, . . ½ oz.
    Origin; marked *a* in Fig. 17.
    Insertion; by tendon common to it and *latissimus dorsi humero-dorsalis* into line marked *b*, in Fig. 16.
12. *M. teres superior*, . 1·47 oz.
    Origin; triangular space on outer side of scapula, marked *c*, Fig. 17, and from spine of scapula.
    Insertion; outer side of pectoral ridge, along line marked *e*, Fig. 17.
13. *M. supraspinatus*, . 1·85 oz.
14. *Infraspinatus*, . . 0·47 oz.
    Inserted just above the *teres superior*, on the humerus.
15. *M. subscapularis*, . . 5·5 oz.
16. *M. triceps*, ... 5·0 oz.

This muscle has two scapular and one humeral head; one of the scapular heads is marked *b*, Fig. 17, the other is near the glenoid cavity, and the humeral head is as usual in all mammals.

17. *M. tricipiti accessorius*, ... 0·57 oz.

This muscle is superficial, and has its origin in the fascia underlying the skin of the back of the arm—it aids the *triceps*, and also braces up the skin of the back of the arm.

18. *M. anconæus*, . . 0·23 oz.

Origin; back of inner condyle.

Insertion; inner side of olecranon process.

19. *M. biceps humeri*, . 1·20 oz.

20. *M. brachialis externus* = *Supinator radii longus*, 0·20 oz.

Origin; line on humerus in continuation of that of the insertion of *teres superior*.

Insertion; anterior superior *crest of radius* (*styloid process*), by means of strong twisted tendinous fascia.

21. *M. brachialis anticus*, 0·35 grs.

Origin; whole outer surface of humerus, below the insertion of *teres superior* (Fig. 17, *e*), and origin of *brachialis externus*.

Insertion; upper and back side of ulna, on a line level with the insertion of the biceps into the tubercle of the radius.

Fig. 17.

2. *Pronators*, . . . 1·55 oz.

viz., 1. *Pronator radii teres*,
2. *Flexor carpi radialis*,
3. *Flexor communis, digitorum*.

These have their origin from the inner condyle of the humerus.

23. *Flexors* of wrist, having their origin from the olecranon process, ... 1.63 oz.

viz.

1. *Flexor carpi ulnaris,*
2. *Flexor digitorum communis,*
3. *Natatorius cuticularis.*

24. *Supinators* having origin from external condyle of humerus, 0·85 oz.
viz.
1. *Extensor carpi radialis,*
2. *Supinator lævis.*

25. *Supinators* having origin from olecranon process . . . 0·55 oz.
viz.
1. *Extensor ossis metacarpi pollicis.*
2. *Extensor primi pollicis internodii.*

26. *Extensors* of wrist, having origin from the external condyle of the humerus, ... 0·40 oz.
Viz.,
1. *Extensor carpi ulnaris.*
2. *Extensor digitorum communis.*
3. *Extensor minimi digiti.*

Part II.—Muscles of the Posterior Limbs.

1. *M. gracilis,* . . . . . 1·88 oz.
Origin; from symphysis pubis (*vide* Fig. 18, *b*).
Insertion; whole length of side of tibia.

Fig. 18.

2. *M. adductor solus*, ... 0·45 oz.
   Origin; from $\frac{3}{4}$ in. behind symphysis pubis, for one inch along the ramus of the ischium (*vide* Fig. 18, *a*).
   Insertion; if the tibia be divided into sixths, the insertion of this, the only adductor, is into the 2nd, 3rd, and 4th sixths reckoned from the top.
3. *M. pectinæus*, ... 0·09 oz.
   The origin is shown in Fig. 18, *c*.
4. *M. iliacus*, ... 0·36 oz.
   Origin; marked in Fig. 18, *d*.
   Insertion; the inner condyle of the femur.
5. *M. quadriceps extensor femoris*, ... 1·15 oz.
   Origin; the origin of the *rectus* is shown in Fig. 18, *e*.
6. *M. sartorius*, ... 0·15 oz.
   Origin; shown in Fig. 18, *f*.
   Insertion; inner side of the patella, and overlying the *rectus femoris*.
7. *M. tensor vaginæ femoris*, ... *not recorded.*
   Origin; from the fascia covering the crest of the ilium, and overlying the *glutæus medius*.
   Insertion; outer side of the patella.
8. *M. glutæus maximus*, ... 2·34 oz.
   Insertion, into the great trochanter, whole outer side of femur, and top of fibula.
9. *M. glutæus medius*, including *pyriformis*, ... 0·48 oz.
   Origin; marked at *g*, Fig. 18.
10. *M. glutæus minimus*, ... 0·45 oz.
    Origin; marked at *h*, Fig. 18.
11. *M. agitator caudæ*, ... 0·98 oz.
    Origin; first five caudal vertebræ.
    Insertion; upper half of the tibia.
12. *M. obturator externus*, ... 1·02 oz.
13. *M. biceps femoris*, ... 0·45 oz.
    Origin; *tuber ischii*.
    Insertion; into the fascia covering the whole outer side of the leg, as in the Lion and other Carnivores; it is a triangular muscle.
14. *MM. semimembranosus et tendinosus*, ... 0·35 oz.
    These muscles conjoined are represented by a single muscle, having its origin from the first caudal vertebra, and its insertion into the lower third of the *fibula*.*
    Before describing the muscles of the leg, it is worth while to sum up the evidence for the assertion made at the commencement of this Paper, that the muscles of the posterior limb in the Seal differ from those of other Carnivores, principally in the shifting of their insertions to lower points on the leg.

---

* It is to be observed that this muscle is inserted into the *fibula*, and not into the *tibia*.

Comparison of Insertion of Muscles in the Seal and Lion.

Muscle.	Point of Insertion.	
	Seal.	Lion.
1. *Adductor magnus*, .	Upper 2nd, 3rd, and 4th sixths of tibia, . . .	Whole length of back of femur.
2. *Iliacus*, ...	Inner condyle of femur, .	Lesser trochanter.
3. *Glutæus maximus*, .	Outer side of femur and top of fibula, ...	Along glutæal intertrochanteric ridge.
4. *Agitator caudæ*, . . .	Upper half of tibia, . . .	Outer side of patella.
5. *Semimembranosus et tendinosus*, . . .	Lower third of fibula, . .	Inner side of knee, and upper third of tibia.

15. *M. gastrocnemius*, ... 2·27 oz.
Origin; from the back of both condyles, and by means of fascia, from the heads of tibia and fibula, all round.
Insertion; *tendo Achillis.*

16. *M. tibialis posticus*, ... 0·20 oz.
Origin; from the back of the tibia, below the poplitæal line, and from the interosseous membrane.
Insertion; into the scaphoid bone, by tendon round inner ankle.

17. *M. flexor digitorum communis*, ... 2·03 oz.
Origin; from the whole length of the back of the fibula and interosseous membrane.
Insertion; by tendon passing round inner ankle, and afterwards distributed to toes.

18. *M. flexor hallucis*, ... 0·43 oz.
Origin; from the oblique poplitæal line on back of tibia and from the head of fibula.
Insertion; by tendon passing round inner ankle, into the tendon of the last; and dividing into branches to the toes which inosculate with those of the common flexor.

19. *M. poplitæus*, ... 0·18 oz.

20. *M. tibialis anticus*, ... 0·70 oz.
Insertion; by tendon in front of ankle, into the base and back of metatarsal of hallux.

21. *M. extensor hallucis*, ... 0·13 oz.
Origin; interosseous membrane, and inner edge of fibula.
Insertion; by tendon in front of ankle, into outer side of base of metatarsal of hallux.

22. *M. extensor digitorum communis = extensor medii digiti*, . 0·55 oz.
Origin; head of tibia, and head and upper third of fibula.
Insertion; by a tendon in front of ankle, into the distal end of the metatarsal of the middle toe.
[There is also a rudimentary *extensor brevis.*]

23. *M. peronæus longus*, ... 0·68 oz.
Origin; from external condyle of the femur, and by means of fascia, from the head of the fibula.
Insertion; by a tendon passing over the outer groove on the upper surface of the os calcis, and thence outwards, downwards, and inwards to the under sides of the tarsal ends of the 1st and 5th metatarsal bones.
This muscle assists the flexors in the feathering action of the great toe in swimming.
24. *M. peronæus brevis*, ... 0·56 oz.
Origin; outer side of fibula.
Insertion; by means of a tendon passing over the inner groove on the upper surface of the *os calcis*, and thence outwards and downwards to the outer side of the tarsal end of the 5th metatarsal bone.
The fibres of this muscle are blended with those of the *flexor digitorum communis*; and it acts as a pure abductor of the little toe, in the plane of the tibia and fibula.

PART III.—MUSCLES OF MASTICATION.

1. *M. digastricus*, ... 0·72 oz.
2. *M. massetericus externus*, ... 0·33 oz.
The external fibres are directed upwards and forwards.
3. *MM. temporalis et massetericus internus*,. . . . . 1·83 oz.
The temporal muscle cannot be separated from the internal fibres of the *masseter*, which are directed downwards, and somewhat backwards.
4. *M. pterygoideus internus*, ... 0·33 oz.
The fibres of this muscle are parallel to those of the external *masseter*.
5. *M. pterygoideus externus*, ... 0·03 oz

MONDAY, JUNE 27, 1864.

The REV. JOHN H. JELLETT, A. M., Vice-President, in the Chair.

Sir WILLIAM WILDE, read a paper

ON THE ANTIQUITIES AND HUMAN REMAINS FOUND IN THE COUNTY OF DOWN, IN 1780, AND DESCRIBED BY THE COUNTESS OF MOIRA IN THE "ARCHÆOLOGIA," VOL. VII.

IN the autumn of 1780, the body of a female, clothed in antique woollen costume, was discovered in a bog, at the eastern foot of Drumkeragh Mountain, in the barony of Kinalearty, and county of Down, the circumstances attending which, as well as the character of the costume, have been described by the distinguished Countess of Moira, in a letter, forwarded to the Society of Antiquaries in London, in 1783. That com-